PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-328335

(43)Date of publication of application : 15.11.2002

(51)Int.Cl. G02B 27/22
H04N 13/04

(21)Application number : 2001-132568

(22)Date of filing : 27.04.2001

(71)Applicant : SANYO ELECTRIC CO LTD

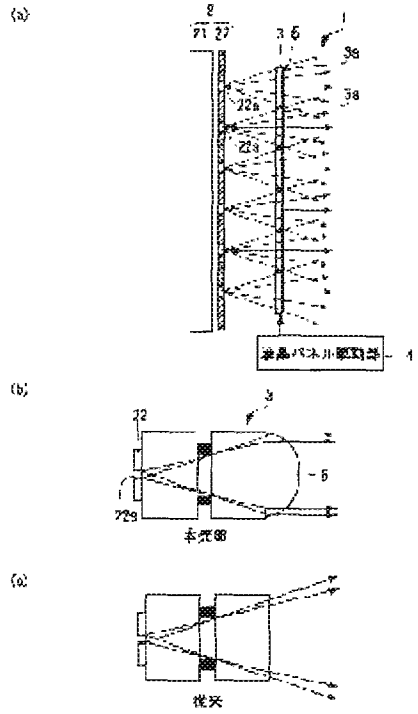
(72)Inventor : HAMAGISHI GORO

(54) THREE DIMENSIONAL VIDEO DISPLAY DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a three dimensional video display device that can realize a more ideal light beams reproduction while keeping down the dispersing of the light beams going through each picture element.

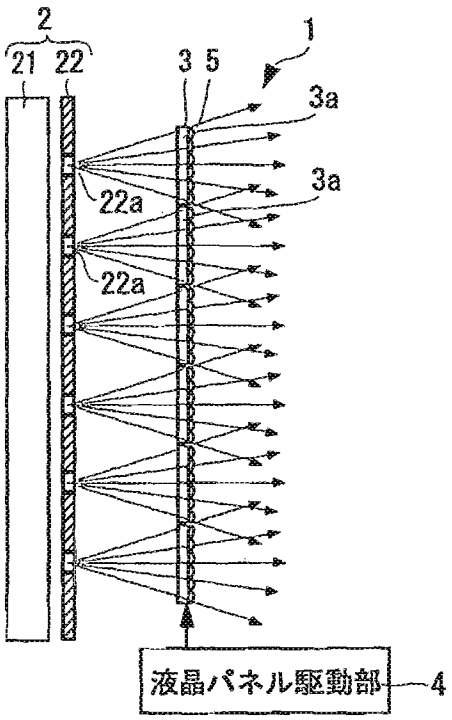
SOLUTION: A light source device 2 comprises a back light 21, a pinhole array plate 22 where pin holes 22a are formed, a liquid crystal display panel 3 and a liquid crystal display panel driving part 4. Micro lenses 5 corresponding to each picture element are formed on a glass on the light emitting side of the liquid crystal display panel 3. The micro lenses 5 work to keep down the dispersing of the light beams resulting from the transmission through the pinholes 22a, their focal positions are set to the parts of the pin holes 22a and the light beams that are going to be dispersed after going through the pin holes 22a are emitted as parallel light beams.



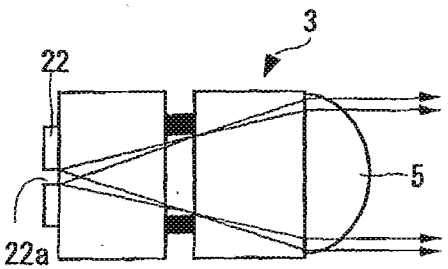
【書類名】　　図面

【図１】

(a)

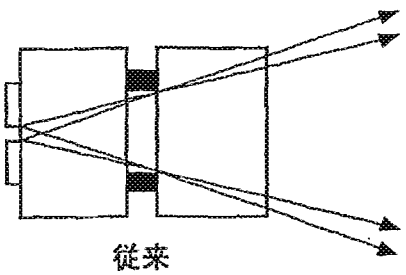


(b)



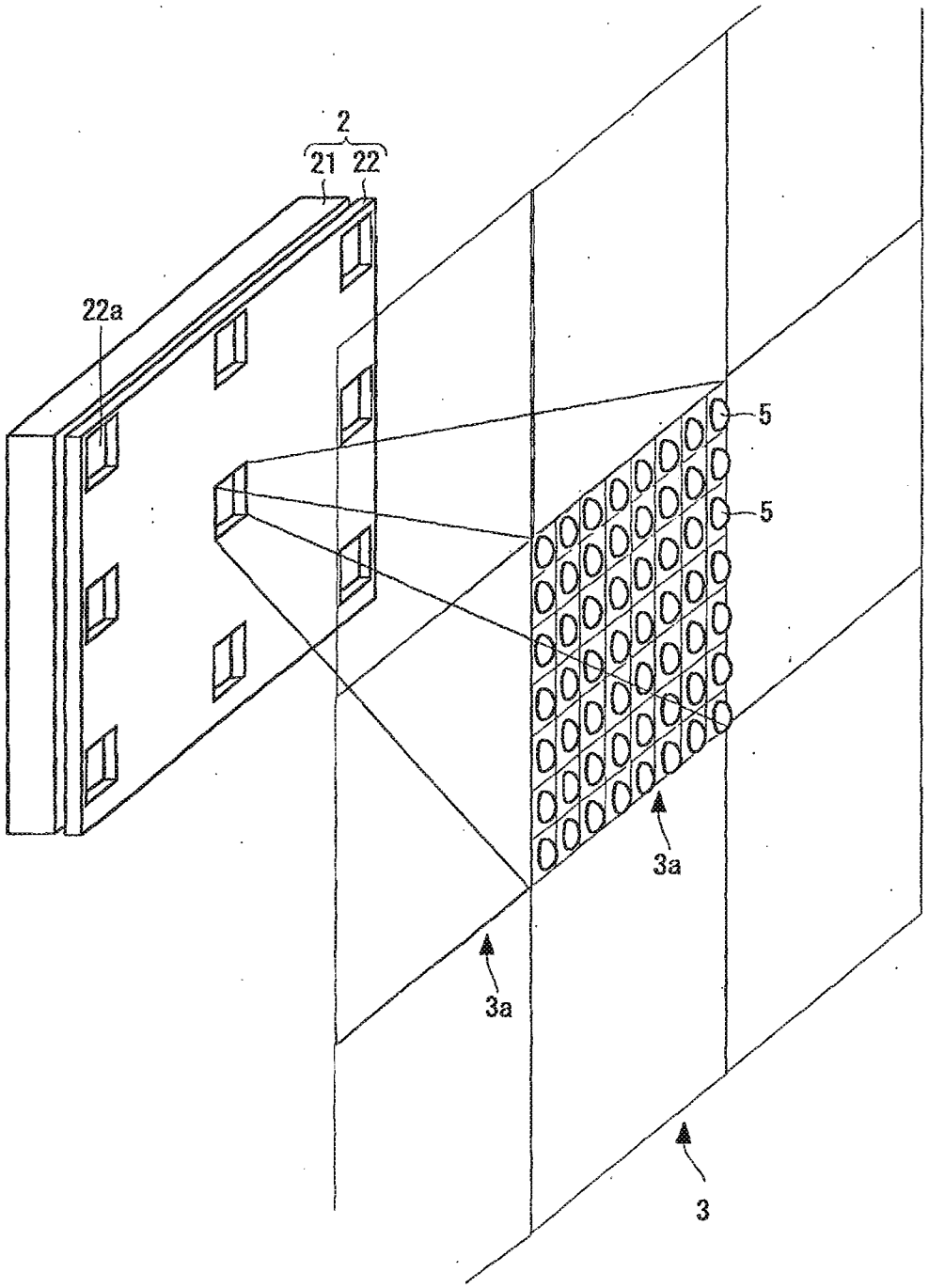
本発明

(c)

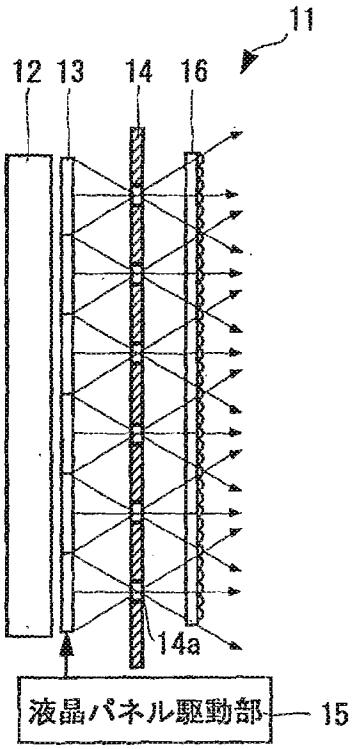


従来

【図２】

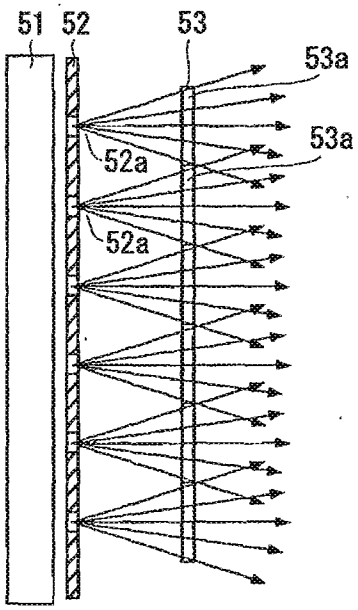


【図３】

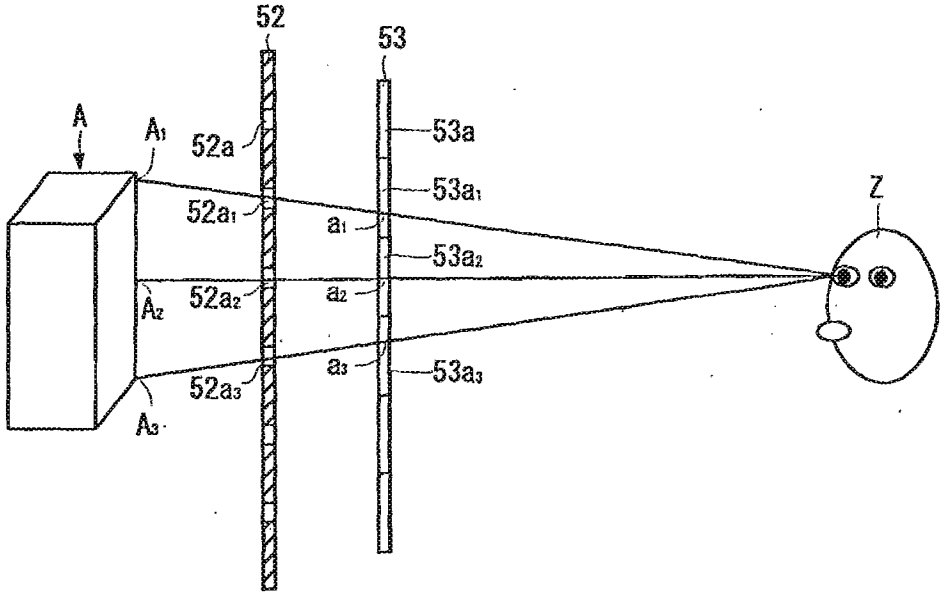


【図４】

(a)


51
52
53
53a
53a
52a
52a

(b)


52
53
A
A1
52a
53a
53a1
52a1
a1
Z
53a2
A2
52a2
a2
a3
53a3
52a3
A3

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]The figure (a) is a sectional view showing the three-dimensional graphic display device of the embodiment of this invention, the figure (b) is an enlarged drawing of a stroke matter portion, and the figure (c) is an enlarged drawing of the stroke matter portion of structure conventionally which was shown in reference.

[Drawing 2]It is a perspective view showing the relation between a pinhole array plate and a picture element region.

[Drawing 3]It is a sectional view showing a three-dimensional graphic display device with other composition in the embodiment of this invention.

[Drawing 4]The figure (a) is a sectional view showing the conventional three-dimensional graphic display device, and the figure (b) is an operation explanatory view.

[Description of Notations]

1 Three-dimensional graphic display device
2 Light equipment
21 Back light
22 Pinhole array plate
3 Liquid crystal display panel
4 Liquid crystal panel actuator
5 Micro lens
11 Three-dimensional graphic display device
12 Back light
13 Liquid crystal display panel
14 Pinhole array plate
15 Liquid crystal panel actuator
16 Micro lens

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the three-dimensional graphic display device which used what is called a beam-of-light playback system.

[0002]

[Description of the Prior Art]Although a parallax barrier system, a lenticular lens method, etc. are known as a method of realizing a 3-dimensional scenography display without needing glasses more nearly special than before, Although these methods are presupposing that the image for right eyes which has a binocular disparity, and the image for left eyes are displayed on a display screen by turns the shape of a strip of paper and a cubic effect of a longitudinal direction is acquired, a cubic effect of a sliding direction has the dissatisfaction which cannot be acquired. When it separates from an appropriate viewing position, the inconvenience that it produces and the position to see cannot be chosen freely also has a phenomenon of reverse ** by which a left eye image enters into a right eye, and a right eye image enters into a left eye, etc.

[0003]On the other hand, in recent years, the three-dimensional video display method called the beam-of-light playback system which can choose the position to see freely is proposed increasingly. This beam-of-light playback system can say the information on a beam of light (namely, the direction of a beam of light and the breadth of a beam of light equivalent to the scattered light from an object) that it passes through a flat surface as the method recorded and reproduced to a flat surface.

As shown in drawing 4 (a), the back light 51, the pinhole array plate 52, and the liquid crystal display panel 53 can constitute the playback equipment, for example.

It can be concluded that the beam of light is emitted in some directions in the predetermined range from each pinhole 52a of the pinhole array plate 52 here. Corresponding to each pinhole 52a, the picture element region (for example, constituted by the width 9-20 and the pixel of 3-20 length) 53a will be formed in the liquid crystal display panel 53. Each pixel of the picture element region 53a controls a light transmission amount to the corresponding beam of light for all directions from the pinhole 52a, and intensity is reproduced by this about an all directions-oriented beam of light. To pixel a_1 of picture element region $53a_1$ which will receive the beam of light from pinhole $52a_1$ in concrete more as shown in drawing 4 (b). To pixel a_2 of picture element region $53a_2$ which the light transmission amount expressing part A_1 of the subject A will be set up, and will receive the beam of light from pinhole $52a_2$. To pixel a_3 of picture

element region $53a_3$ which the light transmission amount expressing part A_2 of the subject A will be set up, and will receive the beam of light from pinhole $52a_3$. The observer Z will recognize the subject A in three dimensions by reproducing a light transmission amount in each pixel corresponding to the predetermined point of the subject A as the light transmission amount expressing part A_3 of the subject A is set up.

[0004]

[Problem(s) to be Solved by the Invention]By the way, in such a three-dimensional graphic display device of a beam-of-light playback system, although it is ideal to maintain the state of a line as for a beam of light, the beam of light which passes along each pixel by the conventional three-dimensional graphic display device will spread, so that it keeps away from a light source.

[0005]An object of this invention is to provide the three-dimensional graphic display device which can control the breadth of the beam of light which passes along each pixel in view of the above-mentioned situation, and can be brought close to ideal Motomi Mitsugi.

[0006]

[Means for Solving the Problem]Light equipment which arranges a punctiform light emitting part which gives a beam group equivalent to the scattered light from an object in order that a three-dimensional graphic display device of this invention may solve the above-mentioned technical problem planate with a prescribed interval, In a three-dimensional graphic display device provided with an image displaying means arranged at the optical this light equipment's outgoing radiation side, and a display control means which sets up a display picture displayed on each picture element region of said image displaying means corresponding to each light emitting part, A micro lens has been arranged in a position which is an optical outgoing radiation side of said image displaying means, and a beam of light of each pixel passes.

[0007]Having the breadth between beams of light about each picture element region, if it is the above-mentioned composition, breadth of the beam of light itself which passes along each pixel can be stopped, and more ideal beam-of-light reproduction can be realized.

[0008]An image displaying means as which a three-dimensional graphic display device of this invention displays an image, Punctiform light transmission section means forming which gives a beam group by which a punctiform light transmission section into which image lights from this image displaying means enter is arranged planate with a prescribed interval, and is equivalent to the scattered light from an object, In a three-dimensional graphic display device provided with a display control means which sets up a display picture displayed on each picture element region of said image displaying means corresponding to each point-like light transmission section, a micro lens has been arranged in a position which a beam of light of each pixel which passed through each point-like light transmission section passes.

[0009]Also in the above-mentioned composition, having the breadth between beams of light about each picture element region, breadth of the beam of light itself which passes along each pixel can be stopped, and more ideal beam-of-light reproduction can be realized.
[0010]It is desirable to coincide an optic axis of a micro lens in the direction of a beam of light. Since a beam of light has mutual breadth about each picture element region and the directions of each beam of light differ, in order to control breadth for every beam of light, maintaining this direction, it is good to coincide an optic axis of a micro lens in the direction of a beam of light.
[0011]
[Embodiment of the Invention]Hereafter, the three-dimensional graphic display device of the embodiment of this invention is explained based on drawing 1 thru/or drawing 3.
[0012]Drawing 1 (a) is a sectional view showing the three-dimensional graphic display device 1. This three-dimensional graphic display device 1 is provided with the light equipment 2, the transmission type liquid crystal display panel 3 provided in the optical this light equipment's 2 outgoing radiation side, the liquid crystal panel actuator 4 which drives this liquid crystal display panel 3, and the micro lens (array) 5.
[0013]The light equipment 2 comprises the back light 21 and the pinhole array plate 22 with which two or more pinholes (light transmission area) 22a were formed in the predetermined part. The liquid crystal panel actuator 4 gives a pixel driving signal to the liquid crystal display panel 3, and makes the picture element region (for example, constituted by the width 9-20 and the pixel of 3-20 length) 3a which comprises two or more pixels corresponding to each pinhole 22a form. That is, the liquid crystal panel actuator 4 sets up the light transmission amount (if it is a color video image light transmission amount of R, G, and B each pixel) of each pixel of the picture element region 3a corresponding to each pinhole 22a.
[0014]As shown also in drawing 2, corresponding to each pixel, the micro lens 5 is formed in the field by the side of optical outgoing radiation of the liquid crystal display panel 3. That is, the micro lens, one per [picture element region 3a / 9-20], for example, width, 5 of 3-20 length is formed. The micro lens 5 is good also as sticking on outgoing radiation side glass the transparent sheet body which could form in the outgoing radiation side glass surface of the liquid crystal display panel 3 soon, or formed the micro lens 5. Each micro lens 5 is what acts in order to stop the breadth of the beam of light obtained by penetrating the pinhole 22a, as shown in drawing 1 (b), The focal position is set as the part of the pinhole 22a, carries out parallel Guanghua of the beam of light which tries to spread through the pinhole 22a, and is emitted. Composition is shown in drawing 1 (c) conventionally which is not provided with the micro lens 5 in reference. By forming the micro lens 5 in the optical outgoing radiation side of each pixel like the above in the three-dimensional graphic display device of a beam-of-light playback system, the breadth of the beam of light itself which passes along each pixel can be stopped having beam-of-light breadth mutual about each picture element region 3a, and more

ideal beam-of-light reproduction can be realized.

[0015]By the way, although each micro lens 5 is easy to make the optic axis vertical to the field of the outgoing radiation side glass of the liquid crystal display panel 5, and to establish it, If the direction of the beam of light which passes along each pixel in each picture element region 3a makes the optic axis of the micro lens 5 vertical to the field of the outgoing radiation side glass of the liquid crystal display panel 5 rather than is the same, the direction of each beam of light and its direction of the optic axis of each micro lens 5 will not correspond. Desirably, in the micro lens 5 of each picture element region 3a, it is good to design so that each may coincide an optic axis in the direction of a beam of light.

[0016]Although the back light 21 and the pinhole array plate 22 constituted light equipment from the above-mentioned embodiment, As a punctiform light emitting part which gives not the thing to restrict to such composition but a sending light line, It may be made to form an emission point by arranging two or more punctiform luminescent means (for example, light emitting diode etc.) to matrix form, or controlling the electron gun (electronic outgoing radiation in the part which should emit light) using CRT.

[0017]Drawing 3 is a sectional view showing the three-dimensional graphic display device 11. The liquid crystal display panel 13 in which this three-dimensional graphic display device 11 was formed in the back light 12 and that optical outgoing radiation side, It has the pinhole array plate 14 formed in the optical outgoing radiation side, the liquid crystal panel actuator 15 which drives the liquid crystal display panel 13, and the micro lens (array) 16 provided in the position which the beam of light which passed through each pinhole 14a of said pinhole array plate 14 passes. The micro lens 16 acts so that it may stop the breadth of the beam of light obtained by penetrating the pinhole 14a, and it is set as the part of the pinhole 14a, and the focal position carries out parallel Guanghua of the beam of light which tries to spread through the pinhole 14a, and it emits it.

[0018]Also in this composition, the breadth of the beam of light itself which passes along each pixel can be stopped having beam-of-light breadth mutual about each picture element region, and more ideal beam-of-light reproduction can be realized. In this composition, spontaneous light type CRT, an EL display panel, etc. can be used as an image displaying means.

[0019]

[Effect of the Invention]As explained above, according to this invention, the breadth of the beam of light which passes along each pixel is stopped having beam-of-light breadth about each picture element region, and the effect that more ideal beam-of-light reproduction is realizable is done so.

[Translation done.]

CLAIMS

[Claim(s)]

[Claim 1]A three-dimensional graphic display device having arranged a micro lens in a position which is an optical outgoing radiation side of said image displaying means, and a beam of light of each pixel passes in a three-dimensional graphic display device characterized by comprising the following.

Light equipment which arranges a punctiform light emitting part which gives a beam group equivalent to the scattered light from an object planate with a prescribed interval.

An image displaying means arranged at the optical this light equipment's outgoing radiation side, and a display control means which sets up a display picture displayed on each picture element region of said image displaying means corresponding to each light emitting part.

[Claim 2]A three-dimensional graphic display device having arranged a micro lens in a position which a beam of light of each pixel which passed through each point-like light transmission section passes in a three-dimensional graphic display device characterized by comprising the following.

An image displaying means which displays an image.

A display control means which sets up a display picture displayed on each picture element region of punctiform light transmission section means forming which gives a beam group by which a punctiform light transmission section into which image lights from this image displaying means enter is arranged planate with a prescribed interval, and is equivalent to the scattered light from an object, and said image displaying means corresponding to each point-like light transmission section.

[Claim 3]A three-dimensional graphic display device coinciding an optic axis of a micro lens in the direction of a beam of light in the three-dimensional graphic display device according to claim 1 or 2.

[Translation done.]